HIGH HEAT WHITE AND YELLOW TRAFFIC MARKING PAINT MGS-91-08D

1.0 DESCRIPTION. These specifications cover high heat traffic paint which shall be suitable for application by spray equipment owned by the Department when heated from 130 F to 160 F and applied on bituminous or portland cement concrete pavements. It shall be capable of receiving and holding glass beads for producing reflectorized traffic markings.

1.1 The attention of the bidder is specifically directed to the following requirement: **Any paint furnished under this provision that: contains non-approved constituents, has been contaminated with any form of material, cannot be satisfactorily applied, or that does not otherwise meet these specifications shall be disposed of by the supplier and immediately replaced with acceptable material entirely at the supplier's expense, including handling and transportation charges. Furthermore, that disposal and replacement process shall include the total quantities of any contaminated paint caused by pumping unsatisfactory material into the department's storage tanks already containing paint. It is to be expressly understood that this requirement is a part of the bid.**

2.0 MATERIALS. All materials used in manufacture shall meet the requirements herein specified. Any materials not specially covered shall meet the approval of the Engineer. The manufacturer shall furnish to the department the batch formula used to produce the paint. The paint shall contain no lead and/or chromium.

2.1 Manufacture.

2.1.1 All ingredient materials shall be delivered in the original containers and shall be used without adulteration.

2.1.2 The manufacturer shall furnish to the department the exact batch formula which will be used in manufacturing the paint. No change shall be made in this formula without prior approval by the department, and no change will be approved that adversely affects the quality or serviceability of the paint.

2.2 Pigment Constituents.

2.2.1 Organic yellow shall be Pigment Yellow C.I. #65.

2.2.2 Yellow Iron Oxide shall comply with ASTM D768.

2.2.3 Titanium dioxide shall comply with ASTM D 476, Type I, Anatase or Rutile Type II for white paint. Titanium dioxide for yellow shall comply with ASTM D476 Rutile Type II..

2.2.4 Aluminum silicate shall consist substantially of anhydrous (calcined) natural aluminum silicate which has been processed to paint pigment quality.

2.2.5 Magnesium silicate shall consist substantially of natural hydrous magnesium silicate that is white, fibrous, finely ground, and is commercially known as paint pigment quality.

2.2.6 Calcium carbonate shall comply with ASTM D 1199, Type GC, Grade I.

2.2.7 Anti-Settling (Organo-montmorillonite) pigment shall be a finely divided hydrous magnesium aluminum silicate mineral activated with 95% methyl alcohol.

2.3 Vehicle Constituents.

2.3.1 The alkyd resin solution shall be a short oil alkyd reduced in toluene to a 59-61% solids content. The solution shall contain a minimum of 41% phthalic anhydride based on the alkyd solids.

2.3.2 Methyl Ethyl Ketone shall comply with ASTM D 740.

2.3.3 Aliphatic naphtha shall meet Federal Specification TT-N-95B, except the specific gravity at 20C/20C shall be 0.680-0.710.

2.3.4 Toluene shall comply with ASTM D 362.

2.3.5 Methyl alcohol shall be commercial Methyl Alcohol suitable for use in paints.

2.3.6 Driers shall be non-lead driers suitable for use in paints.

2.3.7 Anti-Skinning Agent shall be an anti-skinning agent suitable for use in paints.

2.3.8 Soya lecithin shall be of suitable quality for use in paint.

2.4 Pigment Formulation.

2.4.1 Pigment Portion of the White Paint.

	Percent (By Weight)
Titanium Dioxide	20 - 25
Aluminum Silicate	28 - 33
Magnesium Silicate	16 - 21
Calcium Carbonate	20 - 30
Bentone 34, Claytone 40 or Tixogel VP	1 - 2

2.4.2 Pigment Portion of the Yellow Paint.

	Percent (By Weight)
Organic Yellow, min.	6.2*
Titanium Dioxide,min.	6.2
Yellow Iron Oxide, min.	0.3
Aluminum Silicate	30-32
Magnesium Silicate	21 - 26
Calcium Carbonate	31-35
Bentone 34, Claytone 40 or Tixogel VP	1 - 2

No silicas, amorphous or crystalline shall be permitted.

* To be determined by x-ray fluorescence, color spectrophotometry, or any other method the department may choose. This may be sent to an outside agency or organic pigment manufacturer. It also may include audit of the manufacturer's invoices, batch tickets, inventory or any other means determined by the department.

2.5 Vehicle Formulation.

2.5.1 Vehicle Portion of White and Yellow Paint.

	Percent (By Weight)
Alkyd Resin	63 - 69
Solvents, Drier, Wetting Agents,Anti-Skinning Agent	31 - 37

2.6 Mixed Paint. The vehicle and pigment shall be so prepared and blended that the resulting paint shall be uniform in composition and of the required consistency. The paint shall be strained before filling, using a screen not coarser than 40 mesh or a suitable sieve meeting the approval of the Engineer.

2.6.1 No allowance for mixing losses will be made in determining percentages of pigment. The mixed paint shall contain the required percentage of pigment upon analysis. Pigments and vehicles extracted from these paints will be subjected to testing by appropriate methods including wet chemical, atomic absorption, x-ray, flame emission, infrared, liquid chromatography or other available means as may be deemed necessary by the Department to assure compliance with these specifications. If outside testing labs are used, the manufacturer will pay the cost of these tests on any batches the Department finds not to be in compliance with these specifications.

2.6.2 Physical Properties.

% Total Solids, by weight, min.	70
% Pigment, by weight	50-66
% Vehicle, by weight	45-50
% Nonvolatile Vehicle, by weight min.	37
Weight per gallon, lbs, min.	11.90(white) 11.50(yellow)
Viscosity, 77 F, Krebs Units	90 - 110
Grind (Hegman Gage), min.	3
Laboratory Dry Time, ASTM D 711,minutes, max.	8
Field Dry Time, minutes, max.	3

2.6.3 No skinning shall be present on the surface when the paint is allowed to stand in a partly filled closed container for 72 hours. The paint shall be free of lumps and skins when strained through a No. 100 mesh sieve.

2.6.4 The reflectorized line shall dry to "no tracking in 3 minutes" or less when tested in accordance with this specification.

2.6.5 Settling. The pigmented binder in full pint triple-sealed friction top, unlined tin cans shall show no dense or hard settling when stored free of vibration at 120 F air temperature for 5 days. At the end of that period the pigmented binder shall be cooled at room temperature for 4 hours before examination. The degree of settling shall have a rating of 6 of better when evaluated in accordance with ASTM D 869. In making the tests, the filled (filled to bottom of the lip) triple-sealed friction top unlined tin can shall be placed in an inverted position for one hour to insure a complete seal between cover and body of the can. At the end of one hour, the filled can shall be placed in an upright position for at least one hour before placing it in an air temperature of 120 F. The can or cans shall be placed in a single tier.

2.6.6 Bleeding. The white and yellow pigmented binders shall have a minimum bleeding ratio of 0.95 when tested in accordance with Federal Specification TT-P-85 E (or applicable revision). The asphalt saturated felt shall conform to ASTM D 226 for Type 1.

2.6.7 Contrast Ratio. The minimum contrast ratio shall be 0.96 when drawn down with a 0.005 Bird film applicator on a 2A Leneta Chart or equal and air dried for 24 hours. Contrast ratio = Black/White.

2.6.8 Reflectance. The daylight directional reflectance of the white paint shall not be less than 84% and not less than 50% for yellow paint after a 15 mil wet film is applied to a 2A Leneta Chart or equal and air dried for 24 hours. Measure the reflectance of the paint over the black portion of the chart using a Hunterlab D25-9 Colorimeter. ASTM E 97.

2.6.9 Color. The color after drying shall (for white) be a pure flat white, free from tint, furnishing the maximum amount of opacity and visibility under both daylight and artificial light. For yellow, the color shall closely match Chip 33538 of Federal Standard 595 and be ± 6% from the PR 1 chart central color when read over the black portion of a 2A Leneta Chart.

2.6.10 The fixed drying oils used shall be of such character as will not darken under service or impair the color and visibility of the reflectorized line.

2.6.11 No Tracking Time Field Test. The line for the test will be applied when the pavement is dry and the pavement temperature is between 60 F and 120 F, with the Department's equipment at 15 ± 1 mils wet film thickness, 6 pounds of beads per gallon of paint, and a temperature of 130 - 160 F at the spray gun. The time required for the line to withstand the running of a standard automobile over the line at a speed of approximately 40 mph, simulating a passing procedure, without tracking of the line as viewed from a distance of 50 feet, is the "No tracking time" and shall not exceed 3 minutes under any humidity conditions.

3.0 PREQUALIFICATION OF BIDDER. No bid will be considered unless the firm submitting the bid can meet the following conditions:

3.1 That it has in operation a plant adequate for, and devoted to manufacture of pavement marking paint that it proposes to furnish, and is capable of producing batch sizes consistent with the quantities to be delivered.

3.2 That it maintains a laboratory to scientifically control the product bid upon to assure accuracy and quality of formulation.

3.3 That it has produced fast drying high heat traffic marking paint over the past year (1) with a successful application record.

4.0 PREQUALIFICATION OF PAINT.

4.1 Prior to bid opening each bidder shall submit a one quart sample of each paint bid upon. Each paint sample shall be accompanied by certified test results for all of the tests stipulated under Section 2.6 of this specification. Each sample shall be identified by manufacturer's code number and type of paint to permit easy reference and identification. Samples are to be submitted to the State Materials Engineer, Missouri Department of Transportation, Materials Laboratory, 1617 Missouri Blvd., Dock A, Jefferson City, MO 65109.

4.2 Along with the samples, the bidder shall furnish a list of the trade names and manufacturers and/or suppliers of the ingredient materials proposed for use and a copy of his/her batching formula. No changes shall be made without prior approval by the department.

4.3 No award of bids will be made until the paint has met all the requirements specified herein when subjected to testing in the Department's Laboratory. **NOTE:** Normal testing time is a minimum of 30 calendar days.

5.0 SERVICE. Since proper application is deemed essential to the success of this process, the manufacturer shall have at least one technician available to instruct in the application of this type of paint. The technician shall be familiar with the application equipment and the materials, and shall have successful experience in the placing of high heat fast drying traffic paint.

6.0 ACCEPTANCE. The Missouri Department of Transportation reserves the right to make field tests of material prior to award to determine its suitability for application in its equipment and for purposes of determining compliance with drying time requirements of this specification.

6.1 After storage for periods up to 12 months from the date of packaging:

6.1.1 The pigment shall not settle badly or cake in the container, nor shall the paint skin or thicken in storage sufficiently to cause an undesirable change in consistency.

6.2 The paint shall comply with all of the provisions of these specifications, and be capable of being dispersed with a paddle to a smooth uniform condition of useable consistency.

6.3 Any paint furnished under this contract that does not meet these specifications, or that cannot be satisfactorily applied shall be disposed of by the supplier and immediately replaced with acceptable material entirely at the suppliers expense, including handling and transportation charges.

7.0 PURCHASING. The ready-mixed paint shall be purchased by volume. One (1) gallon shall mean two hundred thirty-one (231) cubic inches at seventy-seven (77) degrees Fahrenheit.

8.0 INSPECTION. The successful vendor shall notify the State Materials Engineer, Missouri Department of Transportation, P. O. Box 270, Jefferson City, MO 65102 prior to start of manufacture of any paint. Should the vendor's production facility be outside of the State of Missouri, the department reserves the right to take into consideration, in determining the low bidder, the added cost of inspection at such point compared to inspection performed within the state.

8.1 Samples of raw materials to be used in production and samples of the finished product will be taken during production by a department representative. The manufacturer shall provide, at no additional cost, standard friction-seal pint cans for the sampling of raw materials and quart cans for the finished product.

8.1.1 The manufacturer shall arrange for overnight delivery of the samples to the Department's Central Laboratory and shall be responsible for the total cost of these shipments.

8.2 Manufacture of the paint may be witnessed in whole or part, at the discretion of the State Materials Engineer. Production shall not begin prior to the arrival of the department's inspector, unless prior specific approval for the starting has been obtained. The manufacturer shall accord the inspector free access to those parts of the manufacturing facility wherein the products are being manufactured or raw materials are being stored or finished products being tested, and in all other ways shall facilitate the inspector in performing his duties. Raw materials and finished products, when stored shall be in an orderly fashion to permit proper and correct inventory of these materials at all times.

8.3 Basis for Rejection. Raw materials and/or finished products which fail to meet any requirement of these specifications shall be subject to rejection. Approval of materials as a result of preliminary testing prior to manufacture into finished products shall not be binding upon final approval or rejection. The decision of the State Materials Engineer shall be final in all questions relative to conformance with the provisions of these specifications.